

REMARKS

The following remarks are prepared in response to the Office Action of September 25, 2003. Claims 1-29 remain in the application. Claims 5-12, 23 and 28 stand allowed.

Claims 3 and 4 were rejected under 35 U.S.C. § 102(e) as being anticipated by Awamoto ("Awamoto", U.S. Patent No. 5,898,414). Claims 1, 2, 14, 15, 20-22 and 25-27 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Awamoto in view of Tajima ("Tajima", EP 0945844). Claims 13, 16, 17 and 19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Okano ("Okano", U.S. Patent No. 6,025,818) in view of Awamoto. Applicants respectfully traverse and request reexamination.

Claims 5-12, 23 and 28

Applicants appreciate the indication from the Examiner that claims 5-12, 23 and 28 are allowed.

Claim 18

Applicants presume that claim 18 is allowed because the Examiner did not articulate a rejection or provide any art as the basis for the rejection. If this presumption is incorrect, Applicants would appreciate a chance to respond to any rejection and art the Examiner may cite against claim 18.

Claim 3

Claim 3 defines an image display device including an image changing unit for changing a part of sub-field image data so that adjacent cells in the first direction are uniformly one of ON and OFF in the predetermined sub-field period. The image display device aims to decrease the driving power of the first electrode by reducing changes in voltage waveform applied to the first

electrode and thereby lessening the number of times the first electrode, which is a capacitive load, is charged/discharged, to achieve lower power consumption. Hence, the image display device changes image data so that the illumination (ON/OFF) states of cells corresponding to adjacent pixels in the first direction are as uniform as possible. That is, the image display device changes the image data so as to decrease the number of times the image data of each sub-field alternates between ON and OFF in the first direction. Such changes to the image data are made while maintaining the average luminance of the entire field.

Awamoto does not disclose, teach or suggest the claimed combination of elements as recited in claim 3. Awamoto performs writing in an interlaced manner by reducing lines in sub-fields with low luminance weights. When interlaced writing is performed, illumination occurs on only one half of the total lines in these sub-fields, which causes a drop in the luminance of the entire field. Awamoto doubles the number of sustain pulses in these sub-fields in which interlaced writing is performed, to obtain the same luminance of the entire field as when a method that does not perform interlaced writing is employed. Awamoto does not change the image data to maintain the same luminance. Awamoto does not reduce the driving power but rather shortens the driving time by utilizing interlaced scanning. Hence, Awamoto is devoid of any teaching or suggestion at all of an image display device including an image changing unit for changing a part of sub-field image data so that adjacent cells in the first direction are uniformly one of ON and OFF in the predetermined sub-field period. The rejection of claim 3 should therefore be withdrawn.

Claims 21 and 26

Claims 21 and 26 depend from independent claim 3. All of these dependent claims define the image display device with greater particularity and thus further distinguish over Awamoto and the other references of record. For these reasons and for the reasons set forth above with respect to independent claim 3, the rejection of these dependent claims should be withdrawn.

Claims 4 and 13

Claims 4 and 13 define an image display device including an image changing unit for changing a part of the sub-field image data so as to decrease the spatial frequency, while keeping average luminance of the part of the sub-field image data in the entire field period, within a certain range. A part of the sub-field image data is changed to reduce the driving power of the first electrode while maintaining the average luminance of the changed part.

Awamoto does not disclose, teach or suggest the claimed combination of elements as recited in claims 4 and 13. Awamoto performs writing in an interlaced manner by reducing lines in sub-fields with low luminance weights. When interlaced writing is performed, illumination occurs on only one half of the total lines in these sub-fields, which causes a drop in the luminance of the entire field. Awamoto doubles the number of sustain pulses in these sub-fields in which interlaced writing is performed, to obtain the same luminance of the entire field as when a method that does not perform interlaced writing is employed. Awamoto does not change the image data to maintain the same luminance. Awamoto does not reduce the driving power but rather shortens the driving time by utilizing interlaced scanning.

The invention, as recited in claims 4 and 13, changes the image data to maintain the same luminance whereas Awamoto changes the pulses to obtain the same luminance. Accordingly,

Awamoto is devoid of any teaching or suggestion at all of an image display device including an image changing unit for changing the part of the sub-field image data so as to decrease the spatial frequency, while keeping average luminance of the part of the sub-field image data in the entire field period, within a certain range. The rejections of claims 4 and 13 should therefore be withdrawn.

Claims 22, 24, 27 and 29

Claims 22 and 27 depend from independent claim 4 and claims 24 and 29 depend from independent claim 13. All of these dependent claims define the image display device with greater particularity and thus further distinguish over Awamoto and the other references of record. For these reasons and for the reasons set forth above with respect to independent claims 4 and 13, the rejections of these dependent claims should be withdrawn.

Claims 1 and 2

Claims 1 and 2 define an image display device including an image changing unit for changing a part of the sub-field image data so that (1) a total number of charges and discharges performed on the first electrode or (2) a total amount of power supplied through the first electrode — when writing the sub-field image data becomes smaller. A part of the sub-field image data is changed to reduce the driving power of the first electrode while maintaining the average luminance of the changed part.

Awamoto and Tajima, solely or in combination, fail to disclose, teach or suggest the claimed combination of elements as recited in claims 1 and 2. Tajima aims to decrease the driving power of the first electrode by reducing changes in voltage waveform applied to the first electrode and thereby lessening the number of times the first electrode is charged/discharged. To do so, Tajima changes the order of scanning lines of display electrodes so that the ON state or

the OFF state continues as much as possible. Hence, Tajima performs selective scanning instead of sequential scanning and requires a dedicated, complex arithmetic circuit to determine the order in which the lines are selected.

The invention, as recited by claims 1 and 2, reduces the driving power of the first electrode by changing the image data. Furthermore, the invention sequentially scans the display electrode lines (pairs of display electrodes) from top to bottom on the screen, to write the sub-field image data. Accordingly, Awamoto in combination with Tajima, is devoid of any teaching or suggestion at all of an image display device including the claimed features. The rejections of claims 1 and 2 should therefore be withdrawn.

Claims 20 and 25

Claims 20 and 25 depend from independent claim 2. All of these dependent claims define the image display device with greater particularity and thus further distinguish over Awamoto, Tajima and the other references of record. For these reasons and for the reasons set forth above with respect to independent claims 1 and 2, the rejections of these dependent claims should be withdrawn.

Claims 14 and 15

Claims 14 and 15 depend from independent claims 1-5 and 13. All of these dependent claims define the image display device with greater particularity and thus further distinguish over Awamoto, Tajima and the other references of record. For these reasons and for the reasons set forth above with respect to independent claims 1-5 and 13, the rejections of these dependent claims should be withdrawn.

Claims 16, 17 and 19

Claims 16, 17 and 19 define an image display device including pattern detecting means for reading sub-field image data of a predetermined sub-field period from the image data, storing means, and detecting whether a part of the read sub-field image data has a specific pattern that causes a substantial increase in power consumption when writing the sub-field image data. The invention detects an image pattern which causes an increase in driving power of the first electrode and changes image data based on a current field.

Okano does not disclose, teach or suggest the claimed combination of elements as recited in claims 16, 17 and 19. Okano detects a state where a moving image false contour is likely to occur. Also, Okano suppresses noise called "moving image false contour" that appears due to vision's integral effect, when an illumination state of a sub-field has a specific pattern in a display device which uses the sub-field method. When a frame difference in some pixel is large and a gray-level pattern formed by that pixel and neighboring pixels tends to cause a moving image false contour, Okano changes a gray level of the pixel to a gray level which is unlikely to cause a moving image false contour. Hence, Okano aims to suppress a moving image false contour. Okano also changes image data based on a difference between a previous field and a current field.

The invention, as recited in claims 16, 17 and 19, detects an image pattern which causes an increase in driving power of the first electrode and changes image data based on a current field. Accordingly, Okano is devoid of any teaching or suggestion at all of an image display device including pattern detecting means for reading sub-field image data of a predetermined sub-field period from the image data, storing means, and detecting whether a part of the read sub-field image data has a specific pattern that causes a substantial increase in power

consumption when writing the sub-field image data. The rejections of claims 16, 17 and 19 should therefore be withdrawn.

The other references of record have been reviewed in this case and do not disclose, teach or suggest the present invention as recited by the claims either individually or in any combination.

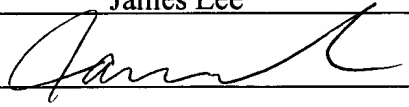
Conclusion

In view of the above remarks, Applicants believe that all the rejected claims are now in condition for allowance and respectfully requests that they be allowed. With all claims in the application allowed, Applicants respectfully request that the application be passed to issue.

If the Examiner believes an interview would be helpful to advance this case, he is invited to contact the undersigned attorney.

Authorization is hereby given to charge our Deposit Account No. 19-2814 for any charges that may be due. Furthermore, if any additional extension is required, then Applicants hereby request such an extension.

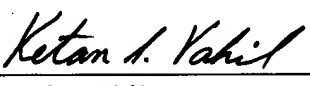
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By: James Lee

Signature

Dated: February 25, 2004

Very truly yours,

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